National Institute of Environmental Health Sciences

Leukocyte activation: The link between inflammation and coagulation during heatstroke. A study of patients during the 2003 heat wave in Paris

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Year: 2008

Journal: Critical Care Medicine. 36 (8): 2288-2295

Abstract:

OBJECTIVE: The mechanisms linking severe inflammation and coagulation during heatstroke are poorly understood. Here, we examined the roles of the tissue factor pathway, leukocyte activation, and mediators of innate immunity in patients admitted to an intensive care unit for heatstroke during an intense heat wave in Paris. DESIGN: Retrospective observational study. SETTING: Intensive care unit of a university medical center. PATIENTS: Eighteen critically ill severe patients with heatstroke were enrolled in the study and 14 age-matched patients with severe sepsis as controls. INTERVENTIONS: None. MEASUREMENTS and MAIN RESULTS: High circulating levels of some inflammation and stress mediators (interleukin-6, -8, C5a, interleukin-1 receptor antagonist, heat shock protein 60 and 70) were observed. Blood leukocyte activation was shown by beta2 integrin up-regulation, L-selectin down-regulation, and strong production of reactive oxygen species and interleukin-8 ex vivo. High levels of circulating promatrix metalloproteinase-9 were detected in all the patients studied, and its active form was present in two patients. Overt disseminated intravascular coagulation according to the International Society of Thrombosis and Hemostasis score was present in five patients. Whole-blood tissue factor was present in all the patients and part of this activity was associated with microparticles in five patients. The degrees of inflammation and disseminated intravascular coagulation are correlated with clinical severity. CONCLUSIONS: These results suggest that neutrophil activation plays a key role in the acute activation of coagulation observed during severe heatstroke, despite a rapid and sustained antiinflammatory response. The comparison with a group of patients with severe sepsis suggests some common mechanisms, but more intense responses during heatstroke.

Source: http://dx.doi.org/10.1097/CCM.0b013e318180dd43

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : France

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Injury, Other Health Impact

Other Health Impact: heat stroke

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Elderly

Other Vulnerable Population: people with psychiatric conditions; people with cardiovascular disease; people with respiratory disease

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified